Faculty of Biological Science and Technology
Zoology and Botanical Department
Practical Histology

Epithelial Tissue
part 1

By: Shirin Kashfi
Ph.D in Animal Development
Sh.kashfi@staf.ui.ac.ir

Some points for better observation and understand histology slide

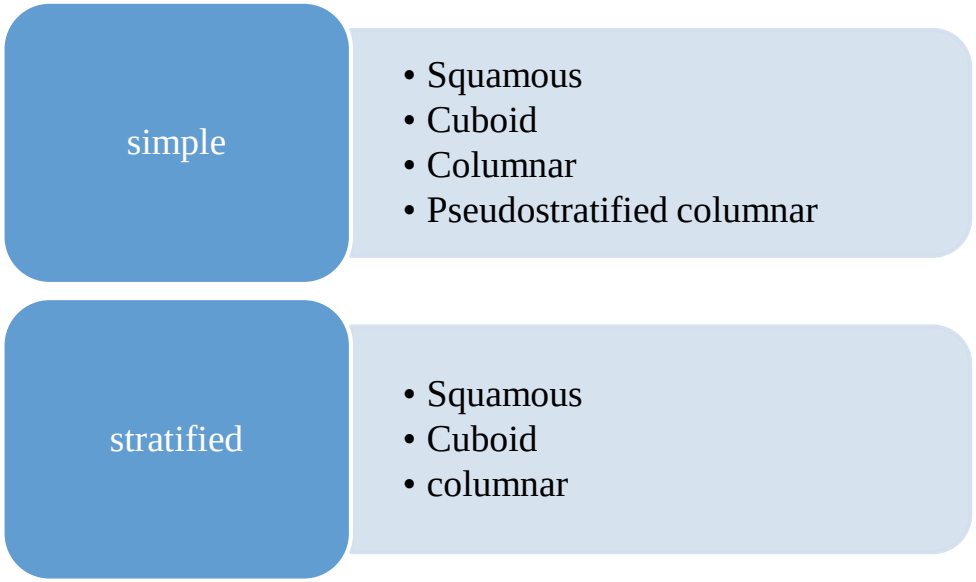
- Due to the fact that in many types of common histology staining, the cytoplasm and the cell membrane become the same color, you cannot separate the two; Therefore, the density and position of the nuclei can be used to determine the number of layers
- In many cases, the shape of the nucleus is a good guide to understand the general state of the cell
- The basement membrane can only be seen with special staining. Therefore, if you do not see it at the basal surfaces of epithelial cells, the reason is the lack of coloring in this part, not its absence
- In hematoxylin-eosin (H&E) staining, the nucleus has a spectrum from blue to purple and the cytoplasm has a spectrum from pink to red

Introduction

- Epithelial tissues line all surfaces of body and separate inside from outside such as skin epidermis, digestive tract or blood vessels
- Topologically, epithelial cells have polarity, in which apical free surface facing outward and basal surface facing inward. Each epithelial cell attaches to neighbor cells by different attached complexes such as tight junction, adherens junction, desmosome, and gap junction
- A thin، dense، sheet-like connective tissue known as basement membrane located beneath epithelial tissue
- Apical surface of epithelial cells may contain cilia، stereocilia or microvilli
- There is no blood vessels in epithelial tissue
- The shape of epithelial cell nuclei tend to mirror the overall shape of cell

Epithelial tissue classification

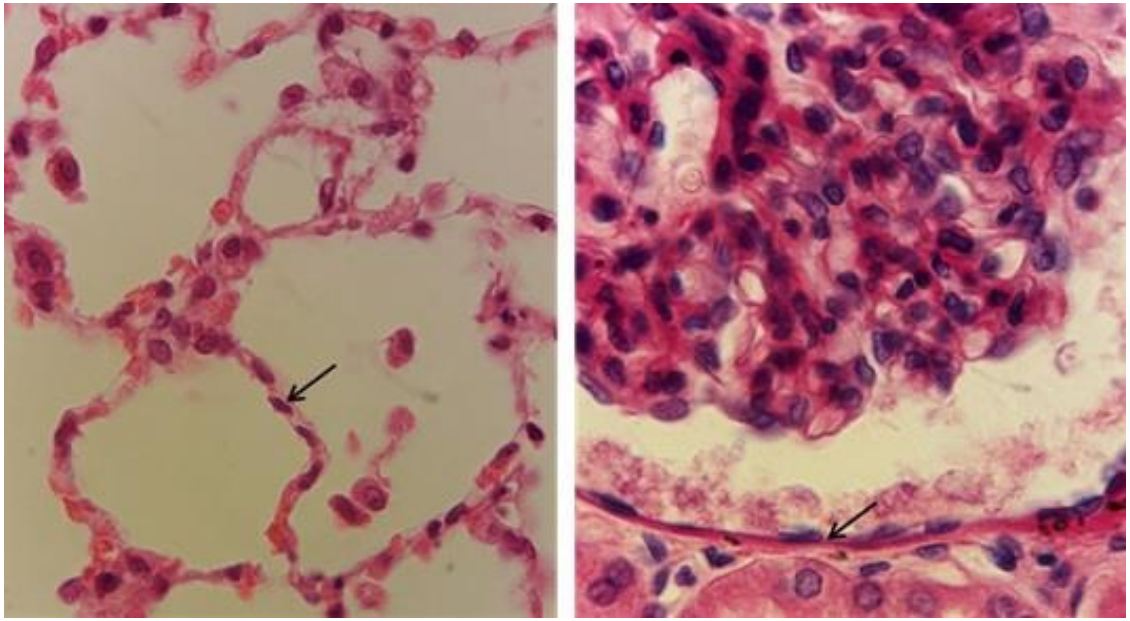
- There are two types of epithelial tissue:
  - Covering (lining) epithelia
  - Secretory (glandular) epithelia
- Covering epithelial tissue may be squamous, cuboidal or columnar in shape. Also, they may arranged in single or multiple layers



- Transitional epithelial tissues is a particular type of covering epithelial tissue with many layers of cells

Simple squamous epithelium

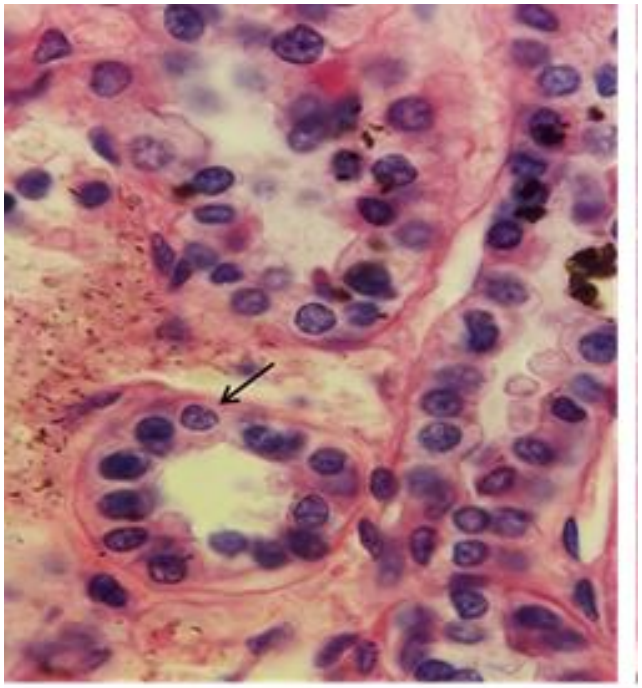
- Simple squamous epithelium is composed of single- layered of thin, flat cells
- Their nuclei tend to be flat and elliptical shape. They are located in the center of cells
- It is found in kidney glomeruli, alveolar wall in lung, blood vessels endothelium, serosa and pericardium



Black arrows depict simple squamous epithelium in lung alveoli (left) and bowman's capsule in kidney (right). H&E, 100X. These pictures are taken from histological slide in histology laboratory of Isfahan University

Simple cuboid epithelium

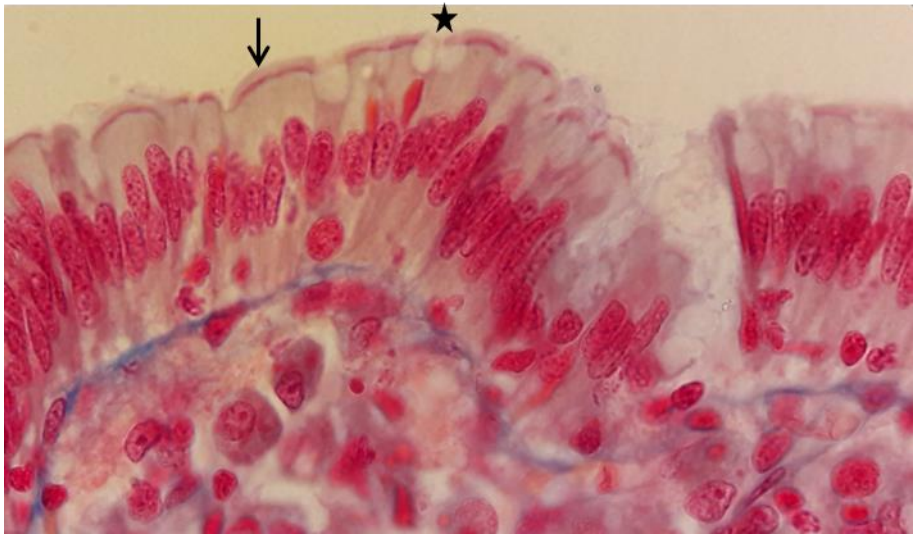
- Simple cuboid epithelium is composed of single- layered of cells that are shaped like cuboid
- Their nuclei are round and located in the center of cells
- It is found in the wall of renal tubules, on the surface of ovary and thyroid follicles



Black arrow depicts simple cuboid epithelium in the wall of renal tubules. Basement membrane is seen in basal surfaces of cells. H&E, 100X. This picture is taken from histological slide in histology laboratory of Isfahan University

Simple Columnar epithelium

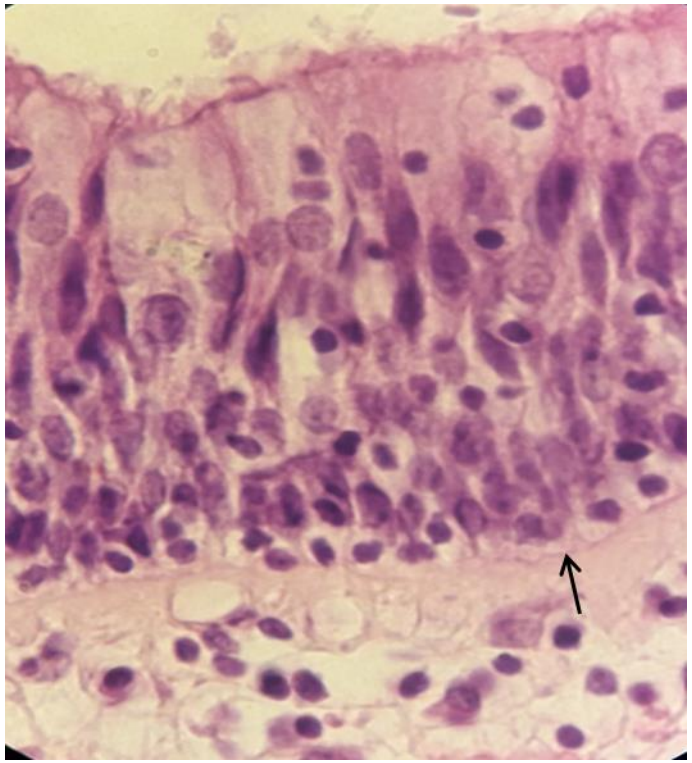
- Simple columnar epithelium is composed of single- layered of cells that are shaped like column
- Their nuclei are elliptical and located in the basal part of cells
- Simple columnar cells may have cilia or microvilli in apical surfaces
- Presence of packed microvilli in apical surface of simple columnar or cuboidal cells are known as brush border because of their brush like appearance
- This epithelium is found in the mucosa of stomach and intestine, bronchi and oviduct
- Goblet cells are specialized simple columnar cells. They are like a goblet with narrow base and wide apex
- Goblet cells are unicellular exocrine gland that secret mucin and scattered in epithelium of digestive or respiratory tract



Simple columnar epithelium in small intestine mucous. Black arrow depicts brush border. Asterisk depicts goblet cells. Blue line is basement membrane. H&E, 100X. This picture is taken from histological slide in histology laboratory of Isfahan University

Pseudostratified columnar epithelium

- Pseudostratified epithelium is a special type of columnar cells that appear to arranged in multiple layers, because of their different size and the situation of their nuclei, but actually they are a single-cell layer
- This epithelium is found in parts of respiratory tract, epididymis and inner ear
- Pseudostratified columnar cells may have cilia (in trachea) or stereocilia (in epididymis)



Ciliated pseudostratified columnar epithelium in trachea. Arrow depict basement membrane. H&E, 100X. This picture is taken from histological slide in histology laboratory of Isfahan University